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Remarks

Claims 23-29, 74, and 75 are pending in the application. Claims 23-29, 74, and 75 were rejected. Claims 23-29, 74, and 75 remain pending in the application. Claim 23 is the independent claim. Reconsideration of the application is respectfully requested.

The examiner rejected claims 23-29, 74, and 75 under 35 USC §102(b) as being unpatentable over Lessing et al. (USP 5,641,585). The examiner acknowledged that the claims are not anticipated by Lessing et al., but asserted that the claimed invention is nevertheless obvious in view of the cited reference.

Independent claim 23 recites a system for supplying a consumer with electrical power. The system includes a fuel cell device, a fuel tank device, and a pump device. The fuel cell device generates electrical power. The fuel tank device houses fuel to be supplied to the fuel cell device. The pump device is provided on the consumer side and supports a fuel supply from the fuel tank device to the fuel cell device. The fuel cell device is provided on the consumer and the fuel tank device is a module that can be inserted into the consumer to supply power and removed from the consumer. The fuel is supplied essentially by the pump device.

In contrast, Lessing et al. disclose a miniature ceramic fuel cell in which the fuel tank is fixed in place, that is, the fuel tank is not a module that can be inserted into and removed from the consumer. As shown in Fig. 1, the fuel tank 18 is fixed in place with respect to the rest of the power supply system 10 and the consumer (cell phone) 14. Lessing et al. do not disclose or suggest that the fuel tank 18 is a module that is adapted to be inserted into and removed from the consumer 14, as recited in claim 23. Other

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embodiments of the Lessing et al. fuel cell are shown and described in the reference; none of these embodiments includes a removable fuel tank, nor do Lessing et al. suggest providing a removable fuel tank. In fact, Lessing discloses that the housing of the cell phone completely encloses the components of the power supply, without suggesting that the fuel tank 18 is accessible for removal or replacement. Column 4, lines 37-41.

The examiner acknowledged that the cited reference does not expressly teach that the fuel tank is a module that can be inserted into the consumer, as recited in claim 23. However, the examiner asserted that it would have been obvious to one of ordinary skill in the art to include an insertable fuel tank in the Lessing et al. device because the artisan would be motivated to do so because it would be expedient to be able to replace the fuel tank when depleted. The examiner further asserted that making integrally-connected elements separable from each other is generally not sufficient to distinguish a claim over the prior art.

It is respectfully pointed out that recognizing a shortcoming of the conventional art that would be solved by an element of the claimed invention does not substitute for disclosing or suggesting that element in order to render the claim obvious. It is improper to use hindsight to determine that the Lessing et al. device could be improved by an innovation of the claimed invention, when Lessing et al. themselves did not recognize the shortcoming or suggest the innovation.

Further, it is not only the case that Lessing et al. do not indicate that the fuel tank can be exchangeable; Lessing et al. also explicitly exclude an exchangeable fuel tank. With reference to Fig. 1, at column 4, lines 37-41, Lessing et al. state that "[t]he housing

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surrounding power supply system 10 is depicted as being open so as to reveal the components therein, although in actual use the housing would completely enclose the components of power supply.” This enclosure would preclude the use of an exchangeable fuel tank, and thus Lessing et al. teach away from the claimed feature.

In addition, making integrally-connected elements separable from each other in this case is an inventive step, and not a mere design choice. Many difficulties are encountered in providing a replaceable fuel tank, none of which was addressed by Lessing et al. For example, any useful fuel for fuel cells inherently has dangerous properties. Among these are flammability (for example, hydrogen, methanol, butane), the ability to form explosive mixtures easily with air (hydrogen), and toxicity of the fuel (for example, methanol). As a result, an exchangeable fuel tank module that is to be handled by a consumer, which must be transported by different means of transportation in commerce, requires overcoming enormous difficulties regarding matters of safety, regulatory compliance, and consumer protection. Lessing et al. did not address these difficulties, and therefore did not contemplate or suggest a replaceable fuel tank, and it follows that Lessing et al. did not provide a suggestion to one of skill in the art to include a replaceable fuel tank in their design or how one might do so. Absent this suggestion, one of skill in the art might recognize on his or her own that a replaceable fuel tank would be beneficial, but would be left with the task of providing the replaceable fuel tank, and overcoming the noted difficulties. In order to avoid the noted difficulties, one of skill in the art would have to be satisfied with the concept proposed by Lessing et al., that is, a device having a fixed fuel tank.

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An analogous example would be the fuel tank of an automobile. In this example, the fuel tank is typically fixed onboard the vehicle and can only be refueled using specially designated, professionally built and serviced refueling stations. No one would fairly assert that one of skill in the art would find suggestion in the design of a conventional automobile that a replaceable fuel tank could easily be provided, even though one of skill in the art might believe that a replaceable fuel tank might provide some advantage. As in the case of the claimed invention, one of skill in the art could imagine that such a feature would be an improvement over the conventional design, but is not put in possession of the improvement by disclosure of the conventional design. Thus, the claimed invention, which features a replaceable fuel tank, is inventive, just as it would take an inventive step to provide a replaceable fuel tank for an automobile.

Further, providing a fuel tank module that can be inserted and removed requires overcoming significant technical challenges regarding the mechanical design, including provision of a mechanical retention mechanism, an ejection mechanism, a leak-tight fluid connection mechanism, and, in some cases, electrical interfaces. None of these factors is addressed by Lessing et al. In addition, an exchangeable fuel cartridge requires a special housing design that allows access to the exchangeable fuel tank module, for example, by means of a lid that can be opened. As noted above, this requirement is not only overlooked by Lessing et al., that reference explicitly discloses a housing that completely encloses the components of the power supply, including the fuel tank.

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Numerous other factors must be addressed when providing a replaceable fuel tank, none of which was addressed by Lessing et al., making the Lessing et al. design unsuitable for use with a replaceable fuel tank. For example:

1. A fuel level sensor is typically used in fixed tanks but typically cannot be used for replaceable tanks, and there are additional difficulties associated with mobile devices, which must work in any orientation. Lessing et al. do not address this, and would leave a user unable to determine whether the exchangeable fuel tank is empty.
2. Not every pump is self-priming, and fuel cell systems are typically destroyed when air replaces fuel. Lessing et al. provide no means to protect the fuel pump and the rest of the system from making contact with air.
3. Lessing et al. make no provision for gaining access to the empty fuel tank. Specially designed housing and replacement mechanisms need to be provided.
4. Lessing et al. make no provision for protecting uncovered interfaces against dirt, dust, misuse, etc.
5. Lessing et al. do not address disposal of the empty fuel tank, which will contain dangerous residual amounts of fuel, or for managing the waste streams associated with the large number of these devices that would be in use.
6. Lessing et al. provide no means for inserting the new tank module, or for the device to determine or provide an indication that a full tank module has been inserted.
7. Other questions that are not addressed or answered by Lessing et al. include:
 - Where do you get a new tank module?

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- How do you transport the new tank module in light of the dangerous properties of any fuel?

-How is the dealer/retailer supplied with such tank modules?

-Is he/she allowed to store useful quantities?

-Are all regulations met?

-How do you make sure that the fuel cartridge and system are compatible to avoid unauthorized fuel cartridges to be coupled to the fuel cell system?

These questions and the factors noted above clearly highlight that one of skill in the art would not be able to use an exchangeable fuel tank with the Lessing et al. device absent a great deal of experimentation and modification rising to the level of inventive effort. While one of skill in the art might recognize that such improvement over the Lessing et al. design would be beneficial, and might be internally motivated by that potential benefit, Lessing et al. do not supply even the suggestion for such inventive effort, and the examiner has not provided the teaching necessary to take that inventive step.

In summary, claim 23 recites a system for supplying a consumer with electrical power that includes a modular fuel tank device that can be inserted into the consumer to supply power and removed from the consumer, for example, for replacement or refilling. Lessing et al. do not disclose or suggest a modular, replaceable fuel tank, do not provide support for such a fuel tank, and do not acknowledge the advantage provided by such a fuel tank. For at least this reason, Lessing et al. do not anticipate the invention recited in

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claim 23. Claims 24-29, 74, and 75 all depend from claim 23, and therefore also are not anticipated by Lessing et al. The rejection, therefore, should be withdrawn.

Based on the foregoing, it is submitted that all rejections have been overcome. It is therefore requested that the Amendment be entered, the claims allowed, and the case passed to issue.

Respectfully submitted,

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